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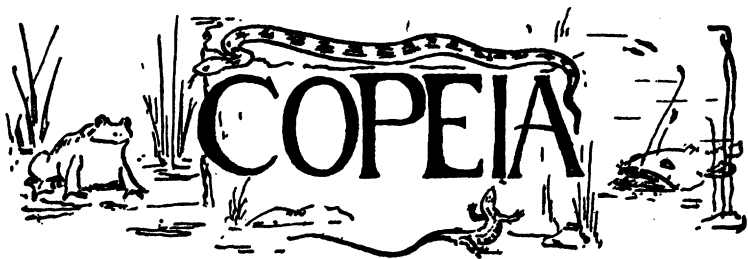
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Published to advance the Science of cold-blooded vertebrates

SOME NOTES ON *Leuciscus vandoisulus* (Cuv. & Val.)

A series of thirty-six specimens of *Leuciscus vandoisulus* were taken by means of a seine (ten feet long, one-quarter inch mesh) on January 1, 1920, from a small stream near Washington; known as Oxon Run; S. E. G12 on the Wash. Bio. Soc.'s indexed map (1918). The relative abundance of this species can be judged, by a listing of the entire catch which was as follows: *Semotilus atromaculatus*—116, *Boleostoma olmstedii*—51, *Rhinichthys atronasus*—49, *Leuciscus vandoisulus* — 36, *Notropis procne* — 22, *Notropis cornutus* — 12, *Eupomotis gibbosus* — 3, *Fundulus diaphanus* — 3, *Abramis crysoleucas* — 2, *Catostomus nigricans*—1, *Erimyzon sucetta*—1, making a total of 296 specimens.

This collection was taken in an area which did not exceed one-hundred square feet, in a pool of rather quiet water which was quite free of debris and aquatic vegetation.

The specimens on capture were immersed in strong Formal-alcohol, and on returning to base, about three hours later, were transferred to 75% alcohol. The following morning it was noted that the larger individuals of *L. vandoisulus* showed the rose-red streak below the lateral line which Jordan and Evermann (1896 "The Fishes of North and Middle America")

state as being diagnostic of living males at the spawning period. A close scrutiny of the specimens revealed that this coloration was present only on the larger individuals, and it should be especially noted that no sign of it was present in life. Arranged graphically according to their respective standard lengths, it was found that the series divided itself into two separate and well defined groups, both forming perfectly normal curves, and that all those with the rose streak without exception fell in the group of larger individuals and vice versa. Subsequently this color faded until at about the end of the month a mere flush remained.

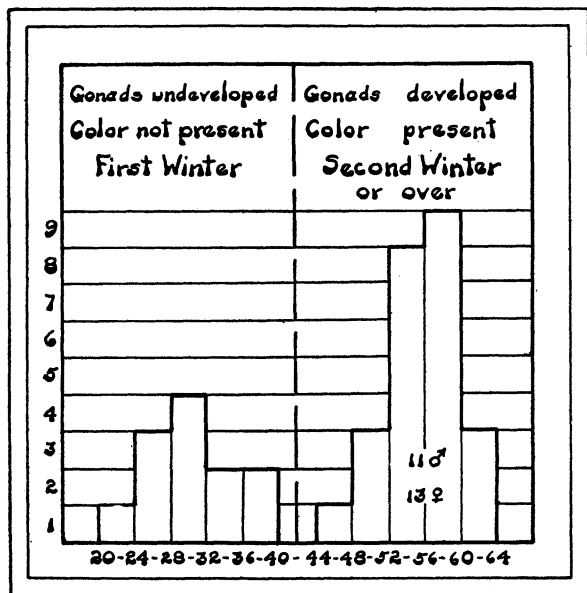
Dissection demonstrated that all the specimens in the group bearing the coloration above alluded to were sexually mature and no doubt would have spawned some time this spring. On the other hand all the smaller individuals were immature, no development of the gonads being visible under the simple microscope.

It should be noted that the mature fishes of both sexes were observed to bear the rosy tint in equal strength, which would seem to indicate that the elements on which its production is based are present in adults, irrespective of sex, even if the breeding males alone exhibit it under natural conditions.

An examination of the scales again divided the series into similar groups, all those in the immature group having scales indicating that they were in their first winter, while the scales of those in the other indicated one or more previous winters having been passed thru. Too much weight should not be placed on the evidence afforded by these scales however as the markings were very obscure and only deciphered with considerable difficulty, a dozen or more scales being examined from each fish. Their perfect accord with the three other factors seems to preclude any great error in this direction however, and, again, it seems almost impossible to have two spawnings in one season that would show such a great difference in size and sexual development.

That this species does not spawn until after surviving two winters is apparently the necessary conclusion.

The largest individuals taken were not over half the size attributed to the species by Jordan and Evermann (1896 "The Fishes of North and Middle



Graph showing the perfect harmony of the four characters, sexual development, coloration brought out in preservative, age according to scale interpretation, size groups. Horizontal index, standard lengths at intervals of 4 mm. Vertical index, number of individuals.

America") but agreed very well with Fowler (1908 "A Synopsis of the Cyprinidæ of Pennsylvania"), $1\frac{3}{4}$ in.— $3\frac{3}{16}$ in. However adverse local conditions or the small size of the series could account for this.

The lesser number of individuals in the group of immature fishes can be attributed to the coarseness of the mesh. Owing to the low temperature, the fish, while feeding and not dormant, were never-the-less sluggish and many were taken that could have squeezed themselves thru the seine with ease if the

water had been a trifle warmer, and they consequently more active.

The four factors herewith found to agree, were all determined independently and at different times, and extreme care was taken in this manner to avoid all personal prejudice.

C. M. BREDER, JR.,
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IMMUNITY ENJOYED BY STICKEL- BACKS

While fishing for white perch (*Morone americana*) on April 11th in the fresh water lake at the head of Wreck Pond, near Spring Lake, N. J., my bait running low I had occasion to use for bait a stickelback (*Gasterosteus bispinosus*).

A haul made with a minnow seine a short time previous in the pool below the dam (brackish tide-water) had netted several stickelback, hard-heads (*Fundulus heteroclitus*) and white-bait (*Menidia*), the latter which my two companions were using for the perch.

The perch were biting very rapidly—over sixty being taken in an hour and a half—but when I offered the stickelback to them, I received not even a nibble, tho my companions fishing on either side of me were constantly catching fish.

Upon removing the stickelback and replacing it with a whitebait I immediately began taking fish. Shortly after one of my companions had the same experience. We marveled at the apparent knowledge possessed by the perch in realizing in the stickelback on unsavory morsel.

The female perch were bulging with roe, and the males with milt, which when grasped in the hand, they expelled.

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